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**Datasheet for the decision
of 9 January 2014**

Case Number: T 0639/10 - 3.4.01

Application Number: 01310712.3

Publication Number: 1221623

IPC: G01R 33/28

Language of the proceedings: EN

Title of invention:

Method for optimal imaging of the peripheral vasculature
emphasizing distal arterial visualization in a multi-station
examination

Applicants:

GE Medical Systems Global Technology Company LLC and Uniformed
Services University of Health Sciences, Department of Defense,
United States Government

Headword:

-

Relevant legal provisions (EPC 1973):

EPC Art. 84

Keyword:

"Lack of clarity"

Decisions cited:

-

Catchword:

-



Case Number: T 0639/10 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 9 January 2014

Appellant 1: GE Medical Systems Global Technology Company LLC
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Appellant 1: Uniformed Services University of Health
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 4 November
2009 refusing European patent application
No. 01310712.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: G. Assi
Members: H. Wolfrum
J. Geschwind

Summary of Facts and Submissions

- I. European patent application 01 310 712.3 (publication No. EP-A-1 221 623) was refused by a decision of the examining division dispatched on 4 November 2009, on grounds set out in a communication of 20 August 2009 concerning lack of novelty and inventive step (Articles 52(1), 54(1) and (2) and 56 EPC 1973), lack of clarity (Article 84 EPC 1973) and added subject-matter (Article 123(2) EPC) for the request then on file.
- II. The applicants lodged an appeal against the decision and paid the prescribed fee on 7 January 2010. On 15 March 2010 a statement of grounds of appeal was filed. The appellants requested, by way of a main request, the grant of a patent on the basis of the claims underlying the decision under appeal, ie on the basis of the set of claims 1 to 4 filed by letter of 7 August 2009. Alternatively, grant of a patent was requested on the basis of sets of claims filed as a first to third auxiliary request, respectively, on 15 March 2010 with the statement setting out the grounds of appeal.
- An auxiliary request for oral proceedings was made.
- III. On 30 July 2013 the appellants were summoned to oral proceedings.

In a communication annexed to the summons, the Board gave a preliminary opinion on the issues of added subject-matter, clarity, novelty and inventive step.

IV. In response, the appellants filed by letter of 9 December 2013 a new request with a set of claims 1 and 2, replacing all former requests.

V. Oral proceedings were held on 9 January 2014.

As a result of the discussion, the appellants requested that the decision under appeal be set aside and a patent be granted on the basis of the set of claims 1 and 2 as filed by letter of 9 December 2013.

VI. Claim 1 of the appellants' **request** reads as follows:

"1. A method of peripheral vasculature imaging comprising:

i) administering a contrast agent (92) into a blood stream of a patient (70);

ii) acquiring (302) a low spatial resolution MR image of an arterial vasculature from the patient (70) when positioned in a first proximal station (76) imaging the abdominal aorta;

iii) checking (304) if a current proximal station is a most distal station (80);

iv) checking (310) if the contrast agent (92) has arrived at a next station (78);

v) moving (316) the patient (70) from the first proximal station (76) to the next station (78) if the current proximal station is not the most distal station (80), whilst simultaneously tracking the passage of the contrast agent (92) through the patient (70) by interleaving (308) a fluoroscopic scan with the image data acquisition, and if the contrast agent (92) has arrived at the next station (78);

vi) continuing to track the passage of the contrast

agent (92) and acquiring data at the current proximal station if the contrast agent has not arrived at the next station (78);

vii) acquiring (302) a new set of low spatial resolution MR images at the next station (78) once the contrast agent (92) has arrived at the next station (78);

viii) repeating steps iii) to vii) to acquire low spatial resolution MR images for a predefined number of proximal stations;

ix) once the contrast agent (92) reaches the distal station (80), acquiring (320) MR data of an extremity of the patient (70) at the distal station (80) sufficient to reconstruct a high spatial resolution image of arterial structure in the extremity of the patient (70);

x) moving the patient (70) back to the first proximal station (76);

xi) acquiring (322) high spatial resolution MR images of the arterial vasculature in all of the predefined proximal stations (76,78); and

xii) combining (326) the high and low spatial resolution MR images to generate arterial only images for all of the predefined proximal stations (76,78)."

Claim 2 is a dependent claim.

Reasons for the Decision

1. In the following reference is made to the provisions of the EPC 2000, which entered into force as of 13 December 2007, unless the former provisions of the EPC 1973 still apply to pending applications.

2. The appeal complies with the requirements of Articles 106 to 108 EPC and Rule 99 EPC and is, therefore, admissible.

3. Clarity (Article 84 EPC 1973)

3.1 Feature vi) of claim 1 on file comprises a step of "*acquiring data at the current proximal station if the contrast agent has not arrived at the next station (78)*", whereas feature vii) defines a step of "*acquiring (302) a new set of low spatial resolution MR images at the next station (78) once the contrast agent (92) has arrived at the next station (78)*".

In the appellants' view, these two features represented an essential aspect of the claimed method distinguishing it from the state of the art on file.

However, the Board considers these crucial features to be unclear for the following reasons.

3.2 An ambiguity arises from the use of an inconsistent terminology of these two features in that it is unclear how the "*data*" acquired at one station, according to feature vi), corresponds to a "*new set of low spatial resolution MR images*" acquired at the next station, according to feature vii).

3.3 Moreover, feature vii), which is an almost literal copy of a phrase given on page 17, lines 4 to 7 of the application description, is problematic in that it is unclear why and how a plurality of low spatial resolution MR images, *ie* a "*set of low spatial resolution MR images*", could actually be acquired at a (proximal) station at which the bolus of contrast agent has arrived.

As far as the application as a whole is understandable, the present invention is based on the idea that, in order to better visualize arterial vasculature, MR image data is acquired in synchrony with a bolus of contrast agent advancing in the arterial vasculature from the abdomen (*ie* a proximal station) to the extremities (*ie* the distal station). Because the speed of the advancing bolus would not leave sufficient time to acquire at each station MR image data needed for reconstructing a high resolution image, bolus synchronized acquisition of MR image data at each of the proximal stations is initially restricted to the acquisition low spatial resolution MR image data.

As a matter of fact, this low spatial resolution MR image data arises from those portions of the patient's arterial vasculature which happen to lie in the field of view of the imaging apparatus at a given station. It is simply not conceivable, in which respect this data obtained at a proximal station could be representative of a set of MR images, *ie* of a plurality of images of the arterial vasculature within the field of view, let alone how this data could be used so as to represent images that would be distinguishable as individual entities.

- 3.4 According to the appellants, the reference to a "*set of images*" in feature vii) was to be understood as implying that data representative of different images was acquired at each station.

Another meaning that could be given to the term "*image*" in feature vii) was that it referred to that group of data which corresponded to the MR signal generated by a one-time excitation with an imaging pulse sequence. The

reference to a '*set of images*' thus indicated that data acquisition at each station encompassed repeated application of the imaging pulse sequence as well as repeated image processing of each group of low spatial resolution MR image data that was acquired before data acquisition moved to a subsequent station at which the bolus had arrived. In the appellants' view, support for such an interpretation was given in the application description on page 17, second paragraph and page 18, second paragraph.

- 3.5 The appellants' arguments are found unconvincing for several reasons.

Already the mere fact that the appellants came up with diverse interpretations as to the meaning of the term "*set of images*" in feature vii) proves the ambiguity of this feature.

Moreover, it has to be kept in mind that the data which is acquired at each of the imaging stations constitutes image data of that portion of the arterial vasculature at which the advancing bolus of contrast agent has just arrived. Hence, this data is representative of just one image, *ie* the image of the arterial vasculature within a station's field of view so that it is not plausible that more than one image of such vasculature could be obtained from the acquisition of data at a given station. It follows that the term "*set of images*" cannot refer to a set of non-identical images of the arterial vasculature.

The other interpretation offered by the appellants is at variance with the conventional manner of MR imaging. Since the data obtained for a one-time application of an

imaging pulse sequence is normally too noisy, it is quite common to acquire MR imaging data from a number of consecutive pulse sequences and to average this data before performing image processing. In this context, a skilled person would not equate the piece of data obtained for each single pulse sequence with an individual image and by no means would he consider separate image processing of such noisy data. Thus, if it was the applicants' intention to refer in feature vii) to such an uncommon course of action, specific information would have to be provided in this respect. Such information is however not only missing from the claim definition but from the application documents as a whole. This is particularly true for the passages of the description cited by the appellant.

In the second paragraph of page 17 of the application as filed, reference is made to the use of "*high spatial resolution images 322*" and "*low spatial resolution images 302*" to identify regions of possible vascular stenosis, as well as to "*new images*" that "*can be generated by combining data from 302 and 322*". Evidently, this piece of disclosure does not support any of the appellants' proposals for the understanding of a set of images acquired at a single station.

The second paragraph on page 18 of the description deals exclusively with the idea to combine "*low spatial resolution data acquired during the initial arterial phase pass*" with data acquired by "*subsequent high spatial resolution imaging of the proximal larger vessels during the later delayed or equilibrium phase*" so as "*to achieve arterial-venous segmentation*". In this context it is summarized: "*Since the same low spatial frequency*

information is acquired in both cases, phase correction can be performed to spatially register data from the two acquisitions by the use of phase correction of the raw k-space data, or by applying a smoothing function at the transition boundaries of the combined data space in order to minimize image blurring artifacts." Hence, nowhere in this passage reference is made to an acquisition of a "set" of low spatial resolution MR "images" at a proximal station during the pass of the bolus.

3.6 For the above reasons, the Board has arrived at the conclusion that claim 1 of the sole request on file does not meet the requirement of Article 84 EPC 1973.

4. The appellants' request is therefore not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

R. Schumacher

G. Assi